CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

Increasing Resilience of Agricultural Systems

Agriculture 2.0: Towards a global revolution for sustainability

IN PARTNERSHIP WITH:

Bioversity International

CIAT International Center for Tropical Agriculture Since 1967 / Science to cultivate change

CIFOR

Centro Internacional de la Papa CIP

FAO Fiat Panis

ICARDA Science for Better Livelihoods in Dry Areas

ICRISAT Science with a human face

IFPRI International Food Policy Research Institute

ILRI International Livestock Research Institute

World Agroforestry Centre

WorldFish

Transforming Agriculture 1.0: Green Revolution

Green Revolution relied on leaps in agriculture productivity in breeds and seeds. Great achievements and lessons learned.

Unprecedented uncertainty

Economic
Greater inter-connectivity of agri-food systems

Political
Inward facing, reactionary, more extreme

Social
Changing demographics, rural to urban, migration

Environmental
Tipping points
Scarcity/ vulnerability

A fundamental shift in global agriculture is required where ***sustainability constitutes the core strategy for agricultural development****.*

Rockström et al. 2016

A convergence of opportunity for sustainability

THE GLOBAL GOALS
For Sustainable Development

Conducive Operating Context
SDGs, Climate Change, Private sector

Opportunities for innovation
Big Data, Renewables

futureearth
research for global sustainability

GLOBAL RESILIENCE PARTNERSHIP

The Economics of Ecosystems & Biodiversity

FE²W NETWORK

4 POUR 1000
LES SOLS POUR LA SÉCURITÉ ALIMENTAIRE ET LE CLIMAT

NATURAL CAPITAL COALITION

Range of technologies

Existing knowledge base and initiatives

Sustainable Solutions for People and Societies

IWMI's Strategic Programs

A water-secure world

Building Resilience:
Water management solutions to counter/for risk and variability

Promoting Sustainable Growth:
Water resource options for inclusive economic development

Managing Rural – Urban Linkages:
Water, (food), and waste innovations in urbanizing landscapes

Cross cutting aspects

Gender – equitable access to resources
Governance and institutions
Learning and capacity development
Impact evaluation

Moving from Opportunity to Reality: What's needed

- **Create the right incentives for change**: through enabling policies and institutions
- **Adapt systems and approaches:** to motivate behavior change
- **Co-design and partner:** so research feeds the design of investments
- **Support different types of innovation**: to fit the local context
- **Target multi-scale delivery:** to address trade-offs and build synergies

Different farmers have different needs

Farm Size	Farmer orientation		
	Subsistence	Semi-commercial	Commercial
Small	XXX	X	X
Medium		XXX	XX
Large		XX	XXX

Improving I&D services will impact the rural community – not just farmers –support for transformation must include increasing off-farm employment.

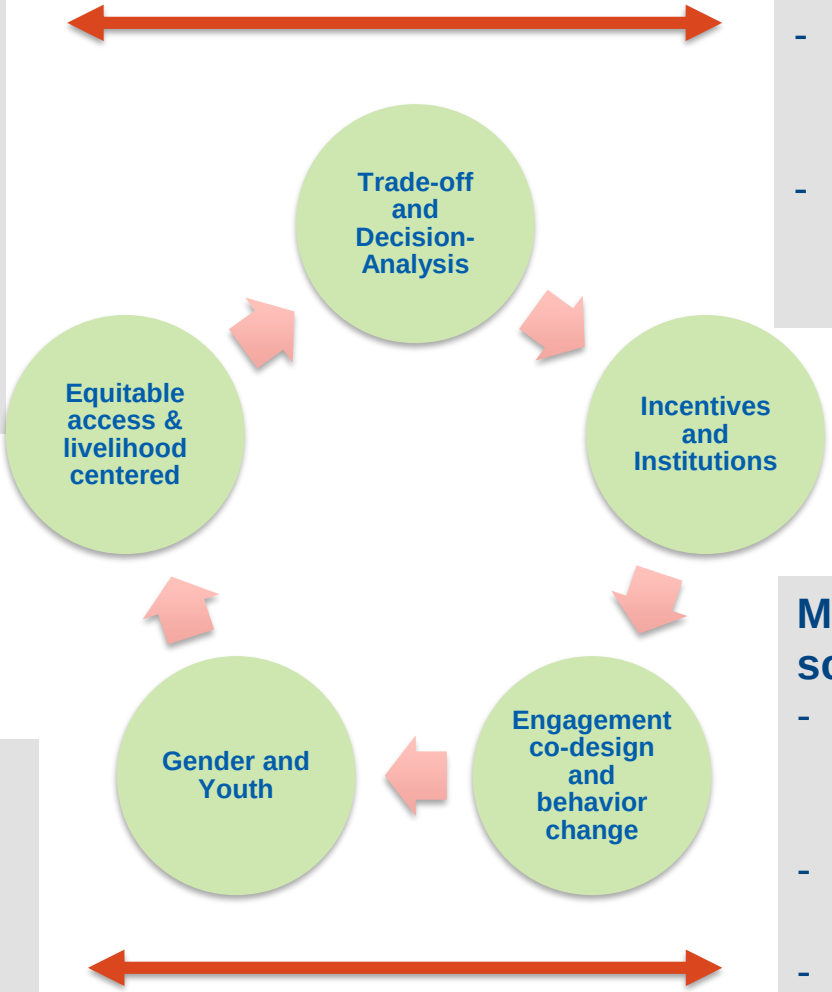
WLE: A new approach to sustainable intensification of agriculture where…

… agricultural development contributes to resilient food systems, ecosystem health and human well-being

WLE's Framework for sustainable intensification of agriculture

Intensifying production within limits
- Fertilizer/chemical use more efficient
- Capitalize on ecological processes
- Carbon sinks in soils

Managing Risks & Variability
- Managing against climate and weather extremes
- Innovative mechanisms for measuring change



Managing at landscape scale
- Ensuring overall sustainability of ecosystem functions
- Trade-offs with other developments
- Bringing unproductive areas into production

Reshaping Rural - Urban Linkages
- Resource recovery and reuse
- Urban agriculture

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

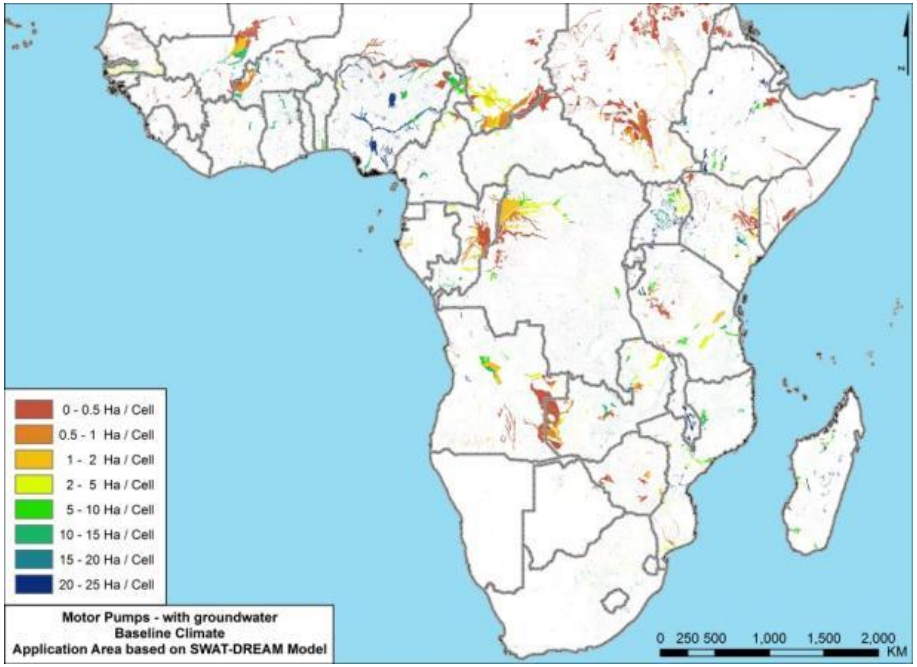
Demand-based innovation:

..enabling farmers to enter markets

From Bucket to Pump—facilitating entry into the irrigation market

Growth potential for motor pumps in SSA:

- 185 million potential rural beneficiaries
- Net revenues up to US$22 billion/yr.



Irrigation Service Provider Model - Pump Rental ^{Plus}:

Local entrepreneur owns 1+ pumps.

Paid per hour for irrigation.

Benefits:

- Incomes for entrepreneurs.
- Income from dry season crops for farmers.

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

Incremental innovation:

..improving efficiency, productivity and competitive differentiation of an existing product or process

ClimaAdapt: Improving Farmer's Adaptive Capacity

Implementing promising adaptation practices

- Direct seeded rice
- Modified SRI (Mechanized transplantation of rice)
- Alternate Wetting and Drying (AWD)
- Weather index insurance
- Green Manure, Azolla and BGA

Some Key project outcomes

- Improved adaptive capacity
- Increased awareness of climate change impacts and adaptation
- Reduced use of inputs (seed, water)
  Policy inputs put into practice

Smart technologies for water management in crops

The sensors are priced at Rs. 2,000 to Rs. 3,000 in the market

M.J. PRABU

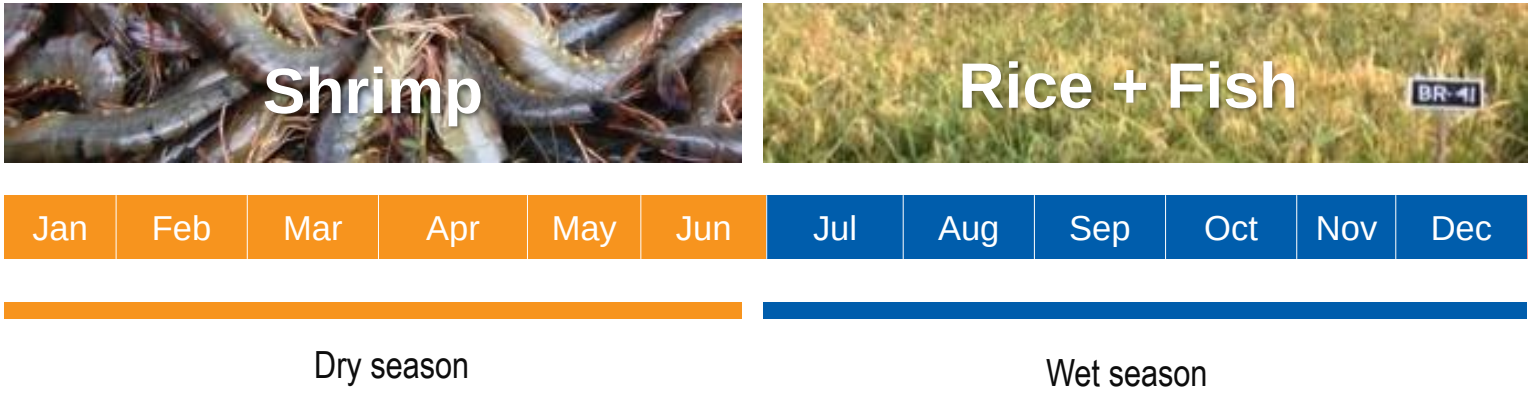
Irrigation projects have always been part of the top agenda in any government policy. Each administration has always introduced something new for its part on the water issue.

"Irrigation projects are like bank ATMs. One knows how much water is being released from reservoirs but does not know how each drop is being distributed or

ClimaAdapt

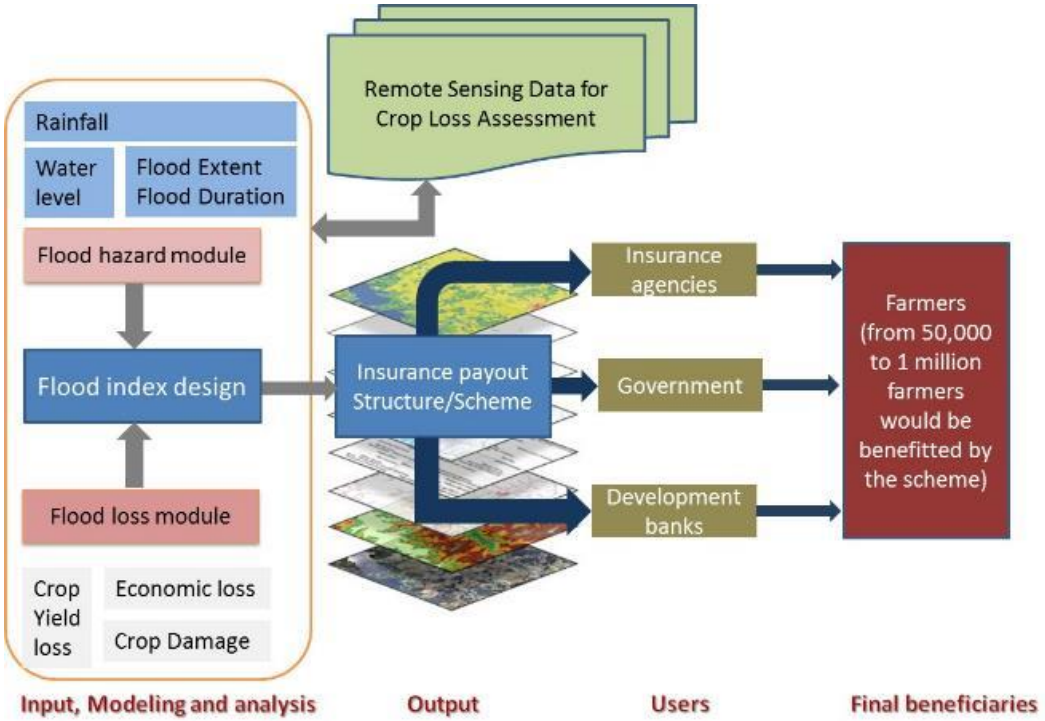
Partners: NIBIO (Norway), TNAU, WALAMTARI, MSSRF, IWMI (with ANGRAU)

Unleashing the agriculture potential in Southern Bangladesh polder zone



- Sub-polder management arrangements have overcome decades of conflict
- System productivity can be increased from 3-6 tons per hectare to 11-19 tons per hectare, depending on location.
- Planning Commission has directed key departments to adopt improved planning, maintenance and management of polders.
- Blue Gold Program committed funding to improve water management infrastructure inside one of the polders to act as a proof of concept.
- Project is also supporting the Delta plan sponsored by DGIS.

Managing variability and risk: index-based flood insurance



2016 Pradhan Mantri Fasal Bima Yojana Crop Insurance Scheme in Bihar:

- **> 285,000 farmers benefit by stabilizing farm income**
- **c. 2.5m ha insured covering crop loss or damage due to natural calamities**

Project partners

Sustainable Solutions for People and Societies

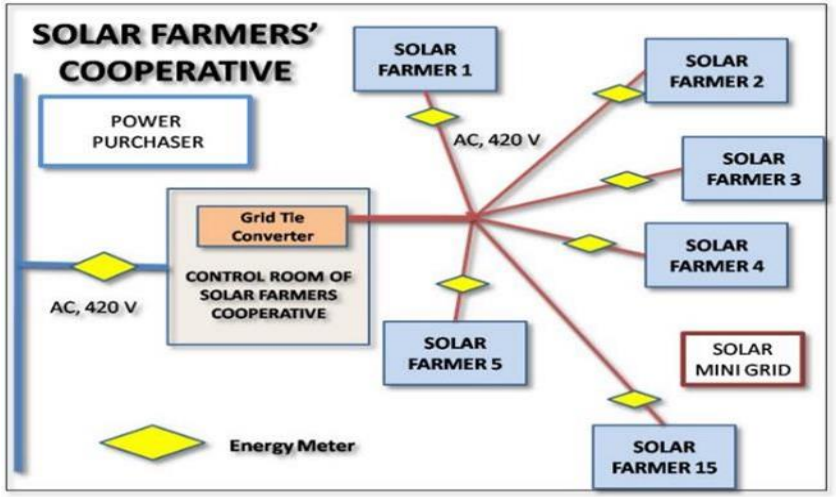
CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

Cross-sector innovation:

..broadening the potential solution space

Improving productivity and livelihoods through smart solar irrigation



The opportunity

- India has 130,000 GW of installed pumping capacity in the form of electric and diesel tube wells
- Sustainable solar irrigation pumps with feed-in tariff for selling excess electricity to the grid

Triple wins

- Reduction in greenhouse gas emissions
- Sustainable use of groundwater
- Higher incomes for farmers

The result

- Launch of the world's first Solar Pump Irrigation Cooperative (SPICE)
- Potential to solarize 100 million 10kW grid-connected irrigation pumps generating 150mkWh green energy

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

Radical innovation:

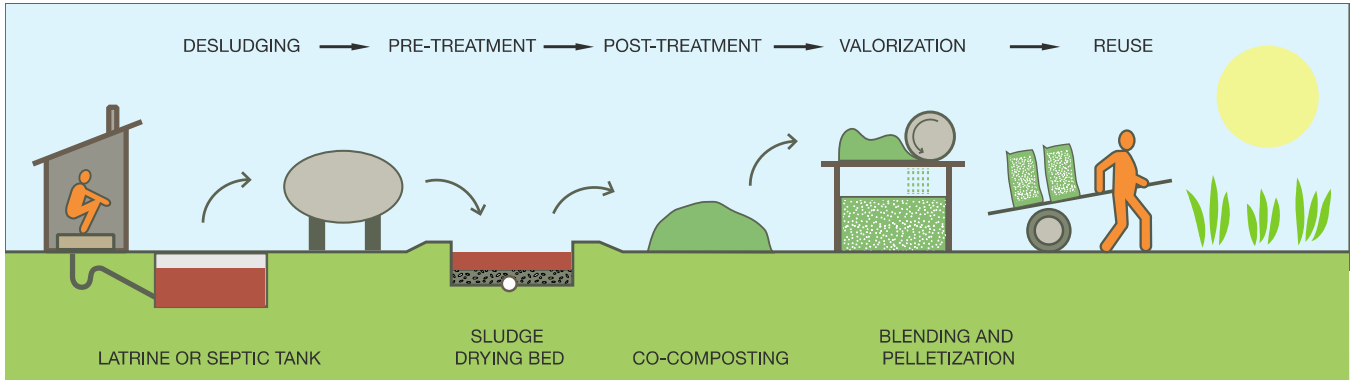
..a fundamental shift in how something is done, towards a new way of operating

Business models to recover nutrients and support a circular economy

Reduce the negative urban footprint on ecosystems and human health through market driven incentives that promote investments in water and energy recovery and reuse

Recovering and reusing resources

Business models and innovative partnerships



- 20 promising business models for the safe reuse of human waste based on 200 case studies across Asia, Africa and Latin America.
- Business models have demonstrated the potential to close the nutrient loop, displace chemical fertilizers, reduce pollution as well as GHG emissions.
- The first investment pledges exceed $4m with four PPPs already established in Ghana (Q1 2017 investment will go commercial).

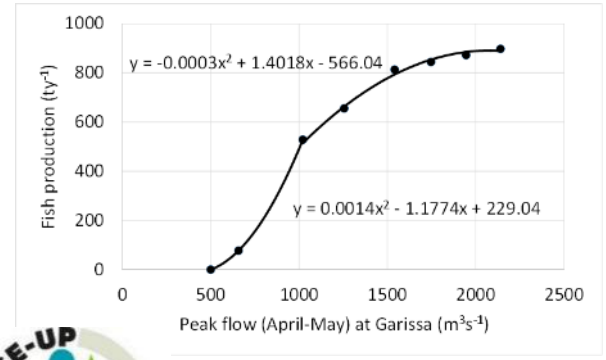
CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY IWMI International Water Management Institute

Transformational innovation:

..resolving ‘wicked problems’ and linking across scales

Balancing built and natural capital – moving beyond entrenched positions by generating the evidence base



Conserving natural resilience and related livelihoods by understanding:

- how land-use and catchment management affect the reservoir
- how upstream tributaries and wetlands interact with reservoirs through movement of water, fish, nutrients etc.
- how dam operation affects both the reservoir and downstream ecosystems
- how the reservoir will evolve over time
- the role of the reservoir in livelihood adaptation for local communities coping with dam-driven change

Arun Jaitley - 2016 Budget Speech

"We need to **think beyond 'food security**' and give back to our farmers a sense of '**income security'**. Government will, therefore, reorient its interventions in the farm and non-farm sectors to **double the income of the farmers** by 2022. Our total allocation (*FY 2016/17*) for Agriculture and Farmers' welfare is **INR 35,984 crore** (USD 5.42 bln)."

Arun Jaitley *Minister of Finance* **February 29, 2016**


CGIAR Research Program on Water, Land and Ecosystems
wle.cgiar.org
1 NO POVERTY
2 ZERO HUNGER
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
11 SUSTAINABLE CITIES AND COMMUNITIES
13 CLIMATE ACTION
15 LIFE ON LAND
17 PARTNERSHIPS FOR THE GOALS